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THESIS

THE EFFECTS OF COMBAT EXPOSURE ON THE MILITARY DIVORCE RATE

by

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March 2012

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Results indicate that in most cases, combat exposure will increase the likelihood of divorce. Additionally, a casualty experience tends to have a greater impact on divorce than does weapon usage. Specifically, weapon usage was found to increase the likelihood of divorce for personnel in the medical service (Navy) and service support (Army). A casualty experience increased the likelihood of divorce for personnel in combat arms (Marines, Army) and service support (Marines). Aside from combat exposure, the results indicate that divorce rates vary across occupational specialties and the likelihood of divorce is substantially higher for women.

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THE EFFECTS OF COMBAT EXPOSURE ON THE MILITARY DIVORCE RATE

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LIST OF ACRONYMS AND ABBREVIATIONS

AFHSC	Armed Forces Health Surveillance Center
AFQT	Armed Forces Qualification Test
BPD	Borderline Personality Disorder
DMDC	Defense Manpower Data Center
DoD	Department of Defense
FY	Fiscal Year
OEF	Operation Enduring Freedom
OIF	Operation Iraqi Freedom
PDHA	Post-Deployment Health Assessment
PTSD	Post-Traumatic Stress Disorder
TBI	Traumatic Brain Injury

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I. INTRODUCTION

A. BACKGROUND

Over the last decade, the U.S. Military has seen a dramatic rise in the number of military personnel engaged in combat operations. This stems from the country's involvement in Operation Enduring Freedom (OEF) and Operation Iraqi Freedom (OIF). The large majority of casualties and wounded have been from ground forces, composed primarily of the Army and Marine Corps. As more military personnel are experiencing combat, the need arises to examine any lasting negative effects this will have on their lives after the conflict.

Past research on the military divorce rate provides some insight into trends seen in the first half of the decade. On the whole, women in each of the four services exhibit higher rates of marital dissolution than men. Additionally, enlisted personnel have seen higher divorce rates than officers. From fiscal year (FY) 2001 to FY2005, marital dissolution rates have steadily increased within the Army, Air Force, and Marines. Navy rates increased from 2001 to 2003, but then declined in the following two years. Rates for all four services in FY2005 were similar to the previous high levels, in FY1996 (Karney & Crown, 2007).

Divorce rates on the national level actually show a slight downward trend over the same period. The Centers for Disease Control and Prevention (CDC) uses census data to estimate marriage numbers and divorce rates by year. CDC numbers (see http://www.cdc.gov/nchs/nvss/marriage_divorce_tables.htm) report a divorce rate of 8.2% in 2001, which then fell to 7.6 % in 2005.

B. OBJECTIVE OF RESEARCH

There is existing research on combat exposure and the effects on family life for veterans of the Vietnam War. However, there has been relatively limited work on combat exposure in Iraq and Afghanistan. The aim of this research will be to determine the effect that combat exposure has on the divorce rate for military personnel who served

in support OEF and OIF. The findings will be beneficial when considering implications for fleet and family support services, as well as military healthcare and combat stress treatment.

The military currently uses the Post-Deployment Health Assessment (PDHA) to screen personnel for mental health issues that may have developed as a result of deployment. The PDHA is required to be completed no earlier than thirty days and no later than thirty days beyond the date returning from deployment. Post-deployment screening also includes a face-to-face health assessment with a trained health care provider, in which they will discuss any responses of interest on the PDHA or other concerns related to the deployment (USD P&R, 2006).This thesis will utilize the PDHA to address the issue of how combat exposure might affect family work conflict.

This study will look at combat exposure in relation to military specialties, as well as gender. The general hypothesis is that combat exposure will have a positive effect on the divorce rate.

C. RESEARCH QUESTIONS

1. Primary Research Questions

a. How does combat exposure during a deployment affect the divorce rate for enlisted personnel in the military?

b. Does the combat exposure effect, if any, differ by specialty?

2. Secondary Research Question

a. Do the different types of combat exposure have varying effects on the divorce rate?

D. SCOPE AND METHODOLOGY OF STUDY

This thesis will examine one aspect of a military member's personal life that can be affected by combat exposure—whether a married service person got divorced or not. The study will use a sample of enlisted personnel who joined the military between 1994 and2007, representing all services. General characteristics associated with a deployment may affect marital stress and divorce, so the sample used will only contain members who

were deployed at least once during this period. In addition, since this thesis examines divorce rates, it is necessary to exclude personnel who have never been married.

For analysis, military personnel who were deployed and reported no combat exposure on their PDHA will make up the control group. The treatment group will consist of personnel who were deployed and reported experiencing combat exposure, such as firing a weapon in combat or seeing killed or wounded individuals.

E. ORGANIZATION

The remainder of this thesis will be organized as follows. Chapter II will cover previous research related to combat exposure and its effect on marital adversity and divorce. Chapter III will provide a description of the data and the variables that will be used. Chapter IV will describe the multivariate models used in analysis. Chapter V will cover the descriptive statistics for the dataset. Chapter VI will present findings from the models. Chapter VII will provide the discussion and conclusion.

F. SUMMARY

This thesis will analyze the effects of combat exposure on the military divorce rate for personnel who served in OIF and OEF. It will seek to determine whether combat exposure varies based on the location, as well as the specific type of exposure. The results will be of value to military healthcare providers, most notably those working in mental health and post-deployment screening.

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II. LITERATURE REVIEW

A. OVERVIEW

This chapter will provide a brief review of prior research related to combat exposure and marital stress or divorce. The majority of these prior studies examine military personnel from the Vietnam War through the present. Some studies with a heavy clinical focus are covered separately. This chapter also includes civilian studies on police officers and first responders during 9/11. Very few of these past studies address a direct effect of combat exposure on divorce, although they point to combat as a source of marital stress and a contributing factor.

B. VIETNAM ERA STUDIES

Laufer and Gallops studied marital patterns using data from the late 1970s in "Life-Course Effects of Vietnam Combat and Abusive Violence: Marital Patterns." The authors used a sample of 1,259 men that were eligible for the draft during the Vietnam War. The sample includes non-veterans, Vietnam-era veterans, and Vietnam veterans[1]. The study separates combat exposure into two main components, combat experience and abusive violence. The variable for combat included a list of ten experiences, with four items receiving a weight of two.[2] Examples of these experiences included receiving incoming fire, encountering mines, and engaging the enemy in a firefight. Abusive violence is identified as the "use of violence against persons when not necessitated by self-defense" (Laufer & Gallops, 1985, p. 840). Abusive violence is also split into two components- whether one witnessed abusive violence or actually participated in it. The authors hypothesize that those veterans who had traumatic experiences would never marry, or experience marriage problems if they did. For additional analysis, the authors divided the sample into two groups based on whether they had served before or after 1968. This year was seen as a transition point in the Vietnam War, and personnel who

[1] Non-veterans include individuals who did not serve in the military during the Vietnam War. Vietnam-era veterans served in the military during the Vietnam War, but did not deploy to Vietnam. Vietnam veterans include individuals who served during this period and deployed to Vietnam.

[2] While the range for the combat scale was 0 to 14, the sample included values ranging only from 0 to 13.

served after 1967 may have faced increasingly intense warfare. Veterans from this period may have also faced increased pressures in the changing military and political environment, which may have aggravated the impact of traumatic combat experiences.

Laufer and Gallops find that an initial comparison of divorce rates shows Vietnam veterans had the lowest divorce rate at 20%, followed by nonveterans (24%) and then Vietnam-era veterans (27%). For Vietnam veterans, the divorce rate was directly tied to the level of combat exposure experienced. Combat exposure was classified as low, moderate and high, with divorce rates of 11%, 18%, and 32%, respectively.[3] The authors find that combat experience increased the likelihood of divorce for personnel during the entire war, while witnessing abusive violence only affected those who served after 1967. Conversely, personnel who participated in abusive violence after 1967 actually decreased their likelihood of divorce (Laufer & Gallops, 1985).

Call and Teachman published a study entitled "Life-Course Timing and Sequencing of Marriage and Military Service and Their Effects on Marital Stability." They examine whether marriage before military service is less stable than marriage during or after service. The data used is a panel of 2,857 white males who were enrolled in Washington State high schools in 1966. Of these 2,857 males, 610 (21%) were Vietnam combat veterans, 581 (20%) were Vietnam-era veterans, and 1,666 (58%) were nonveterans. In the authors' analysis, the dependent variable was the cumulative probability that the marriage ended for an individual at each marital duration. The marital duration was recorded in whole months. The authors found the baseline divorce rate for this cohort to be around 3.6%. The characteristics of one's service did not have a significant effect on the probability of divorce. Specifically, Vietnam combat experience had no discernible effect on marital stability (Call & Teachman, 1996). However, the authors cite one of their older studies which found that soldiers who experienced the "most intense combat situations (Call & Teachman, 1996, p. 225)" showed a decrease in marital stability, while most other Vietnam veterans were unchanged.

[3] Combat exposure levels were delineated as follows: low = 0 to 3, moderate = 4 to 9, high = 10 to 13.

One of the more comprehensive studies is by Gimbel and Booth and entitled "Why Does Military Combat Experience Adversely Affect Marital Relations?" The sample included 2,101 enlisted men who served in the Army between 1965 and 1971. The authors hypothesize that increased exposure to combat will lower an individual's marital quality and stability. Three separate models are used, with the dependent variable identified as marital adversity. The first model tests whether pre-military factors help to explain why combat exposure affects marital stability. In this case, it is hypothesized that the factors which drive men toward combat are responsible for the apparent effect of combat on marital stability. In other words, combat is a supplementary cause to the disruption of marriage. The second model analyzes how PTSD symptoms caused by combat may affect the marriage, both directly and indirectly. The direct effect is that the man is difficult to live with, while the indirect effect is that he may be incapable of maintaining steady employment and income, or furthering his education. The hypothesis for the second model has two parts. First, the relationship between combat and marital adversity can be explained by PTSD symptoms or antisocial behavior, both caused by combat exposure. Second, these combat-induced PTSD symptoms and antisocial behaviors account for how marital adversity interacts with income, unemployment, and educational attainment. The third model assesses whether pre-combat mental health issues may be further exacerbated by combat exposure, with direct and indirect effects on the marriage. Again, there are two hypotheses for this model. First, combat exposure enhances the effect that pre-combat *mental health* will have on marital stability. Second, combat increases the effect of pre-combat *antisocial behavior* on marital stability.

Gimbel and Booth include a very detailed description of their measures for both marital adversity and combat. Marital adversity is measured on a scale which takes into account previous and current marriages. The scale covers an array of issues, such as divorce, infidelity, abuse, and extended separation. The variable for measuring combat exposure consists of twelve items, rated from zero to four[4], totaling up to a 48-point

[4] The scale for combat is defined as follows: 0 = never, 1 = rarely, 2 = sometimes, 3 = often, 4 = very often.

scale. The items included experiences such as firing on enemy, receiving incoming fire, encountering mines and booby traps, being ambushed, seeing dead allies or enemies, and killing an individual.

The results of the first model indicate that pre-military factors related to school problems and early emotional problems do have some role in marital adversity. However, these pre-military factors only explain a portion of the relationship between combat exposure and marital adversity. In the second model, the authors find that PTSD symptoms and antisocial behavior account for the majority of marital adversity related to combat, confirming the first part of their hypothesis. Furthermore, they find that antisocial behavior is the primary driver, and PTSD symptoms play a much smaller role in marital adversity. In the latter portion of the second model, they find that antisocial behavior plays the main role in marital adversity, while the factors related to employment, income and education have a relatively minor effect. To further investigate the effects on antisocial behavior, the authors experimented with regressions between combat, antisocial behavior, PTSD symptoms, and the remaining control variables. This analysis resulted in some interesting findings. The authors determined that combat alone did not have a direct effect on marital stability. In fact, antisocial behavior is the only factor that directly affects marital adversity. From the second model, the authors conclude that exposure to combat directly increases antisocial behavior, which in turn reduces the stability of marriage. In the third and final model, the authors' hypothesis proved incorrect. They predicted that combat exposure would aggravate pre-existing mental health and antisocial issues. When there is an interaction between combat and both emotional problems and school problems, there was little effect on marital adversity. However, the interaction between combat and school problems contributes to the development of antisocial behavior, while the interaction between combat and emotional problems tends to increase post-traumatic stress.

Overall, Gimbel and Booth produced some interesting results from their analyses. The findings support the idea that combat exposure in itself does have an effect on marital stability. Combat can have a greater effect on men with pre-existing emotional problems, than those who do not. Perhaps most important is the finding that marital

adversity is most commonly manifested through post-traumatic symptoms and antisocial behavior. Furthermore, antisocial behavior appears to be the predominant cause (Gimbel & Booth, 1994).

C. POST-VIETNAM ERA STUDIES

Teachman and Tedrow published a study entitled "Divorce, Race, and Military Service: More than Equal Pay and Equal Opportunity" in which they examine enlisted African-American men in the Army in a period from the late 1970s into the 1980s. While their research did not specifically address deployments or combat exposure, there is some benefit in some comparisons made in the study. They find that divorce rates in the Army jumped from 2.1% in 2001 to 3.5% in 2004. Divorce rates in other services increased as well, but to a lesser extent. Since the Army may fulfill the lion's share of combat missions and have the greatest level of combat exposure, this may be an indicator of combat's impact on divorce (Teachman & Tedrow, 2008).

The study entitled "On the Home Front: Stress for Recently Deployed Army Couples" by Allen, Rhoades, Stanley and Markman looks at Army couples in 2006 and 2007. The authors use combat exposure as an index to determine how stressful a particular deployment was for an individual. The sample included 300 married couples with an Army husband and civilian wife, with the husband having been deployed within the previous year. Combat exposure was measured using a scale in which personnel indicated the frequency with which they had experienced various combat situations, to include firing on the enemy and performing "dangerous duties." While the study did include some variables on factors relating to marital stress, it did not link these to the husband's combat exposure. The dependent variable was level of stress, with separate regressions for the husband and wife. The authors found that, compared to variables related to resources and perceptions,[5] combat exposure was the greatest predictor of increased stress levels (Allen, Rhoades, Stanley, & Markman, 2011).

[5] Resource variables included those such as husband's rank and income, economic strain, military family, and connection to other Army families. Perception variables included Army adjustment and perceptions of Army concern, Army value, and mission value.

The RAND Corporation worked on a study called the "Invisible Wounds of War" which focused on veterans of OIF and OEF. The study focused on mental health, specifically the conditions of post-traumatic stress disorder (PTSD), major depressive disorder, and traumatic brain injury (TBI). The study utilized 11 questions on combat exposure to formulate two indices. First, it determined whether an individual received an injury or wound requiring hospitalization during a deployment. Second, they used ten different trauma exposures to create a scale indicating which traumas had been experienced during the individual's deployments for OEF/OIF. Out of these measures, the most commonly reported experience was vicarious trauma, usually having a friend killed or seriously wounded. The authors confirm that combat traumas experienced were the best indicators of mental health problems related to PTSD and depression. Another issue introduced is known as secondary traumatization, often caused by caring for someone with a combat-related mental disorder. An example of secondary traumatization is when a spouse begins to exhibit symptoms of trauma themselves. Although this study included some useful trends on combat exposure in OEF and OIF, the authors did not include any results on its impact on marital stress or divorce. The authors estimated health costs, but were unable to quantify costs related to marital strain (Tanielian & Jaycox, 2008).

D. CLINICAL STUDIES

Scaturo and Hayman published the report "The Impact of Combat Trauma Across the Family Life Cycle: Clinical Considerations" in which they focus on how combat trauma affects different stages of family life. The authors use six main stages of family life from a 1973 study by Haley. These stages include courtship and mate selection, marriage, childbirth and childrearing, marriage at mid-life, children leaving home, and retirement and late-life. The authors reflect on past work that points out "an array of social expectations of the married man (Scaturo & Hayman, 1992, p. 277)," and the fact that these expectations can combine with post-traumatic symptoms for increased stress in the family. They also note that traumatic combat experience for the husband can have an emotional aftereffect that disrupts the emotional attachment and bond in a marriage (Scaturo & Hayman, 1992).

E. CIVILIAN STUDIES

There are a few studies that focus on traumatic stress among police officers and responders during 9/11. While these studies cannot directly parallel experiences in military combat, they do offer insight into resulting psychological conditions after being exposed to highly stressful and life-threatening incidents. Even though none of the studies directly address the consequences of traumatic stress on divorce, review of the literature nonetheless provides information on possible factors that might amplify the effect of combat stress on divorce.

1. Police Officers

A study on crisis intervention models by Castellano and Plionis presents some interesting statistics related to PTSD. The authors cite that PTSD affects around 3% of the standard population, yet law enforcement officials normally exhibit a level close to 10%. Firefighters can be affected at an even higher level, often ranging from 10% to 30%. Perhaps the most telling statistic is that of those who experience a mass disaster, an estimated 34% may suffer from PTSD. Castellano and Plionis point to evidence indicating that emergency response personnel involved in 9/11 constitute a group with a high risk of psychological problems and divorce (Castellano & Plionis, 2006).

2. 9/11 Responders

Alvarez and Hunt published a study called "Risk and Resilience in Canine Search and Rescue Handlers After 9/11." The study compares canine search and rescue handlers who were deployed in support of 9/11 response efforts with those who were not deployed. Interestingly, the sample used included more women than men.[6] The authors used self-reporting questionnaires and interviews to identify trauma experienced along with past history levels. The findings were that those handlers who had been deployed suffered from higher levels of psychological stress, PTSD symptoms, and peritraumatic[7]

[6] Sample of canine handlers included 65 women (57%) and 49 men (43%).

[7] Peritraumatic dissociation is defined as dissociative behavior that specifically occurs in relation to a traumatic event (Panasetis & Bryant, 2003).

dissociation. The authors also found that handlers who cited a better social support network and higher relationship satisfaction exhibited fewer symptoms in two of the measures (Alvarez & Hunt, 2005).

A final civilian study written by DiGrande et al., analyzes posttraumatic stress among residents of Manhattan two to three years after 9/11. The study looked at 11,037 residents and used interviews to determine exposure through either an injury or witnessing a horror. Their qualifications for witnessing a horror could be similar to certain aspects of combat, as they included seeing an airplane hit the towers, seeing injured or dead people, and seeing individuals jump or fall from the towers. The authors found that individuals with lower educational attainment and lower income demonstrated elevated levels of PTSD, and women were also at higher risk. Among others, marital status was a significant predictor of PTSD symptoms. The PTSD rate for married individuals was around three percentage points lower than those who were never married, and twelve percentage points lower than those who were divorced (DiGrande et al., 2008).

F. SUMMARY

This chapter has provided an overview of existing research related to combat exposure and the effect on marital adversity and divorce. Much of the literature published has focused on Vietnam veterans, and only a limited number have addressed OIF and OEF veterans. In addition, most focus on the Army with fewer studies on the Marines. Very little research was found on Navy and Air Force combat exposure. Some conclusions from the findings listed include:

- The level of intensity of combat exposure may have a relative effect on the probability of marital disruption or divorce.
- Combat exposure may contribute to other factors such as post-traumatic symptoms or antisocial behavior, which in turn may affect marriage.
- The political environment and level of support at home for a particular conflict may intensify the effects of combat exposure.
- Pre-existing emotional problems may amplify the effects of combat exposure.

III. DATA DESCRIPTION

This chapter includes a description of the data used. The chapter includes a section on the data sources, a section on sample restrictions, and a summary.

A. DATA SOURCES

The data utilized for this study came from two sources, The Defense Manpower Data Center (DMDC) and the Armed Forces Health Surveillance Center (AFHSC). The DMDC data consisted of enlisted personnel files, which included demographic data from 1994 to 2007. The data from the AFHSC includes responses from the post-deployment health assessment, from the years 2001 to 2007.

1. Defense Manpower Data Center

The enlisted master personnel file provided by the DMDC contains demographic information, recorded on a quarterly basis from 1994 to 2007. The file used contains data from all four services, and includes both individuals who deployed and those who did not. It includes demographic data such as age, race, education, dependent status, paygrade, marital status, armed forces qualification test (AFQT) scores, and occupational codes. Several variables from DMDC are used to control for factors that may affect an individual's likelihood of divorce. Occupational codes are used to determine how the effects vary across job specialty.

2. Armed Forces Health Surveillance Center

The data collected from the AFHSC contains responses to DD Form 2796, the post-deployment health assessment (PDHA). The PDHA is a self-reported form required for military personnel following a deployment greater than 30 days,[8] or as determined by a component commander (USD P&R, 2006).

[8] Individuals deploying in the Continental United States (CONUS) or outside the Continental United States (OCONUS) with fixed medical treatment facilities (MTF's) may not be required to complete a PDHA.

The PDHA records information on a deployment such as location, time period, combat experiences, and various measures of physical and psychological health. The PDHA records specific information on the type of combat exposure. The two main categories of combat exposure are weapons usage and casualty experience. These categories will be used to determine whether the divorce rate varies with differences in combat exposure.

B. SAMPLE RESTRICTION

For this study, the sample was restricted to the years from 2001 to 2007. Since the aim is to determine the effect of combat exposure on divorce, all single individuals were dropped. There may be general characteristics or stresses of a deployment that could affect divorce, so individuals in the sample who were not deployed were also dropped. The sample was restricted to only those individuals who were married before a deployment. Additionally, this sample included only those in their first marriage.

With the data in this study, there were a few concerns over spuriousness between divorce and deployments. More specifically, the longer a person is married, the longer the time period that he/she can be deployed. At the same time, it is likely that the longer an individual is married, the lower the risk of divorce. Individuals married for a longer time may have more invested in the relationship such as children, property, and other mutual assets. As a result, we are likely to observe more incidences of deployment among those with longer marriages. If we were to observe individuals from the day they are married to the time they divorce, we could obtain a spurious positive correlation between deployments and length of a marriage. To counter this potential bias, the data was divided into three-year periods of observation. The sample was initially divided into five groups, based on the year of marriage between 2001 and 2005. Each group was then restricted to only include deployments in the subsequent two years after marriage. For example, the group married in 2002 only included deployment and divorce data through the fourth quarter of 2004. The five groups were then combined with an indicator attached to each observation reflecting the year of marriage. In other words, there are five marriage cohorts (2001 to 2005). The five groups were combined into one analytical sample, and each group is identified by a marriage cohort indicator in the model. For

example, a service member who was married in 2001 has a value of 1 for the 2001 marriage year indicator, and 0 otherwise. More details of the variables are described in the next chapter.

C. SUMMARY

This chapter presented the two sources of data used in this thesis, as well as a description of how that sample was restricted for the purposes of analysis. The data from the enlisted personnel files and the PDHA responses were merged by social security number.

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IV. VARIABLES AND DESCRIPTIVE STATISTICS

This chapter will identify and describe the main variables that will be used in this study. The variables will be separated by the dependent variable, the primary independent variables, and other control variables. This chapter will also include descriptive statistics of the data, separated by service.

A. DEPENDENT VARIABLE

1. Divorce

In this study the dependent variable is divorce after deployment. Between the variables provided by DMDC and AFHSC, there was no indication of when a divorce occurred in relation to the individual's deployment. The date used to determine an individual's deployment was the date recorded as departure from theater, or the area where they were deployed. The sample was restricted to individuals who were married prior to deployment, and only when that deployment occurred in the subsequent two years after marriage. The control group is made up of individuals who remained married after deployment. A binary variable "treatment group" was created that takes on the value of one when an individual divorces after returning from deployment.

B. PRIMARY INDEPENDENT VARIABLES

1. Combat Exposure

The primary independent variable for this study is combat exposure. This information is taken from the PDHA data collected after a member's deployment. The PDHA is in the format of a questionnaire, so the information is self-reported. Combat exposure is separated into two distinct categories, weapons usage and casualty experience.

a. Weapons Usage

The PDHA records general weapons usage, as well as the manner in which the weapon was fired. For this analysis, four binary variables are used to indicate weapons usage.

(1) A binary variable indicates whether the individual fired their weapon at any time during a deployment (regardless of location or situation)

(2) Three separate binary variables indicate whether the individual fired their weapon at any time during a deployment from:

- Land
- Sea
- Air

b. Casualty Experience

The PDHA also records data on levels of exposure classified as casualty experiences. The primary two categories are whether an individual saw wounded or killed persons, and whether the individual was exposed to destroyed military vehicles. These responses were formatted into binary variables where a value of one indicates that the individual experienced it.

(1) A binary variable indicates whether an individual saw persons wounded or killed, or encountered dead bodies (regardless of situation). Three separate binary variables indicate whether the person viewed was:

- Enemy
- Coalition
- Civilian

(2) A binary variable indicates whether an individual entered or closely inspected a destroyed military vehicle.

2. Occupational Specialty

The occupational specialty for each individual is taken from the enlisted personnel file. Occupational specialties differ across the services, so the Department of Defense (DoD) occupational conversion index was used to group similar occupations together. Using the conversion index, the specialties were condensed into the roles of combat arms, medical service, combat service, and service support. While some

individuals on deployment may perform duties different than those indicated in the personnel file, data from DMDC is the most reliable. The omitted variable is combat arms. The four occupational groups are listed below, with a couple examples included for each service. Additional details related to the occupational conversion index are included in Appendix A.

a. Combat Arms

(1) Navy specialties include Assault Boat Coxswain (BM 0164) or LCAC Radar Operator/Navigator (OS 0304).

(2) Marine specialties include Rifleman (0311) or M1A1 Tank Crewman (1812).

(3) Army specialties include Combat Engineer (12B) or Hawk Missile System Crewmember (14D).

(4) Air Force specialties include Aircraft Loadmaster Manager (1A200) or Pararescue Journeyman (1T251).

b. Medical Service

(1) Navy specialties include Field Medical Service Technician (HM 8404) or Medical Deep Sea Diving Technician (HM 8493)

(2) Army specialties include General Surgeon (61J) or Podiatry (67G).

(3) Air Force specialties include Dental Manager (4Y000) or Dental Laboratory Journeyman (4Y052)

c. Combat Service

(1) Navy specialties include WSN-5 Inertial Navigation Set Technician (IC 4728) or Outboard Engine Mechanic (EN 4313).

(2) Marine specialties include Multi-Channel Equipment Repairer (2831) or Ground Radar Technician (2889).

(3) Army specialties include Signal Support Systems Specialist (31U) or Avionic Systems Repairer (35R).

(4) Air Force specialties include Intelligence Applications Journeyman (1N051) or Aerospace Maintenance Apprentice, C-17 (2A531D).

d. Service Support

(1) Navy specialties include Photojournalist (PH 8148) or Flag Officer Writer (YN 2514).

(2) Marine specialties include Landing Support Specialist (0481) or Counterintelligence Specialist (0211).

(3) Army specialties include

(4) Air Force specialties include Engineering Craftsman (3E571) or Personnel Superintendent (3S090).

C. CONTROL VARIABLES

1. Gender

The variable to control for gender is a binary variable, taken from DMDC data. The variable takes on a value of one if the individual is female.

2. Age

The data from DMDC on an individual's age varies depending on when the data was collected. Using the date recorded and the individual's marriage date, a variable was created to identify the individual's age at the time of marriage.

3. Race

The master personnel file includes multiple binary variables to indicate race. All observations were narrowed down to the variables of white, black, other, Hispanic, and unknown. The omitted category in regressions is white.

4. Education

The education variables are binary, taking a value of one if the individual achieved a particular level of education. The education indicators from the personnel file include variables such as GED, high school diploma graduate, associate's degree, bachelor's degree, and others. These indicators were condensed and the education variables included in the sample are non-high school diploma graduate, high school diploma or above, and bachelor's degree. The omitted category is non-high school diploma graduate.

5. Paygrade

The enlisted personnel file records the paygrade in the same manner as age, so it varies based on the time when it was recorded. The data was coded to create a variable that indicates an individual's paygrade at the time of their marriage.

6. Marriage Cohort

The year an individual was married is included as a binary variable, taking the value of 1 if they were married in a given year. The omitted variable is married in 2005.

7. Change in Dependent Quantity

The birth of a child may have a substantial effect on whether a couple divorces or remains married. The enlisted personnel file records dependent information on a quarterly basis, which was then transformed into variables indicating the number of dependents in each particular quarter. The quarterly variables were then used to create an indicator that identified a change in the number of dependents after marriage. This binary variable takes on the value of 1 if the number of dependents increases by 1 or more during the observed period.

8. AFQT

The Armed Forces Qualification Test (AFQT) is the primary measure of aptitude utilized by the DoD. The AFQT is one of the primary determining factors for accession into the military. The range of scores is broken up into five categories, with category I

and II representing above average, category III seen as average, category IV below average, and category V indicating significantly below average (USD P&R, 2005).

D. DESCRIPTIVE STATISTICS

The statistics presented in these sections will provide a picture of the sample used for regression analysis. The first section will provide a brief look at the baseline divorce rates for this sample. The second section will address demographic characteristics. The third section will present data on divorce rates and combat exposure, particularly by occupational specialty and gender.

1. Divorce Rates

Table 1 shows the baseline divorce rates for the sample. These rates are calculated regardless of combat exposure or demographic characteristics. The Air Force and Navy show slightly higher divorce rates, while the Marines and Army are relatively close at just under 9%.

Table 1. Overall Divorce Rates of Sample

	Navy	Marine	Army	Air Force
Divorce Rate	12.52%	8.90%	8.48%	14.60%
	(33.09%)	(28.48%)	(27.86%)	(35.31%)
Observations	13303	15988	44216	13628
Standard deviations in parentheses				

2. Demographic Characteristics

Table 2 includes the descriptive statistics of the primary demographic control variables included in the statistical models. These variables include gender, age, paygrade, change in dependent quantity, race, education, AFQT score, year of marriage, and occupational specialties.

Table 2. Demographic Characteristics

Gender/Age/Paygrade/Dependent	Navy	Marine	Army	Air Force
Female	10.91%	3.76%	11.63%	18.13%
	(31.17%)	(19.02%)	(32.06%)	(38.53%)

Gender/Age/Paygrade/Dependent	Navy	Marine	Army	Air Force
Age (at time of marriage)	22.40	21.08	22.73	21.46
	(3.45)	(2.46)	(3.57)	(2.49)
Paygrade (at time of marriage)	3.39	3.23	3.36	3.27
	(1.09)	(0.95)	(1.15)	(0.85)
Change in Dependent Quantity	22.67%	21.92%	32.79%	28.91%
	(41.87%)	(41.37%)	(46.94%)	(45.34%)
Race				
White	40.65%	47.10%	34.37%	46.03%
	(49.12%)	(49.92%)	(47.49%)	(49.84%)
Black	16.74%	8.06%	13.27%	9.68%
	(37.34%)	(27.22%)	(33.93%)	(29.57%)
Other	7.99%	3.03%	3.66%	3.12%
	(27.12%)	(17.13%)	(18.78%)	(17.38%)
Hispanic	12.84%	13.77%	10.23%	4.70%
	(33.45%)	(34.46%)	(30.30%)	(21.17%)
Unknown	21.78%	28.05%	38.47%	36.47%
	(41.27%)	(44.92%)	(48.65%)	(48.14%)
Education/AFQT				
Non-high school diploma graduate	6.43%	2.63%	7.31%	0.87%
	(24.52%)	(16.01%)	(26.03%)	(9.27%)
High school graduate or above	88.56%	96.40%	83.72%	89.98%
	(31.83%)	(18.62%)	(36.92%)	(30.03%)
College Degree	1.49%	0.41%	2.87%	0.96%
	(12.11%)	(6.41%)	(16.71%)	(9.76%)
AFQT	50.90	57.55	57.01	62.66
	(23.88)	(18.70)	(19.59)	(17.51)
Year of Marriage				
2001	10.10%	14.94%	8.35%	8.87%
	(30.13%)	(35.65%)	(27.66%)	(28.43%)
2002	25.60%	23.17%	21.31%	18.50%
	(43.65%)	(42.20%)	(40.95%)	(38.83%)

2003	32.04%	19.57%	20.32%	22.09%
	(46.66%)	(39.68%)	(40.24%)	(41.49%)
2004	20.86%	21.07%	23.66%	27.08%
	(40.63%)	(40.78%)	(42.50%)	(44.44%)
2005	11.40%	21.25%	26.36%	23.46%
	(31.79%)	(40.91%)	(44.06%)	(42.38%)
Occupational Specialty	Navy	Marine	Army	Air Force
Combat Arms	29.12%	31.52%	29.51%	16.19%
	(45.43%)	(46.46%)	(45.61%)	(36.83%)
Medical Service	10.82%	N/A	6.53%	3.75%
	(31.06%)		(24.70%)	(19.00%)
Combat Service	49.44%	30.77%	29.58%	35.93%
	(50.00%)	(46.15%)	(45.64%)	(47.98%)
Service Support	41.59%	40.72%	39.05%	39.49%
	(49.29%)	(49.13%)	(48.79%)	(48.89%)
Observations	13303	15988	44216	13628
Standard deviations in parentheses				

Table 2 presents summary demographic characteristics of the enlisted sample for each service, regardless of combat exposure. Each service is predominantly male, with the Marines having the highest proportion of males at just over 96%, and the Air Force with the lowest at just under 82%. The mean age at marriage is similar across all four services, at around 21 to 22 years old. The mean paygrade at marriage is steady across the services, at E-3. The proportion of personnel who gain one or more dependents in their first three years after marriage is slightly higher for the Army and Air Force, compared to the Navy and Marines. Almost one-third of Army personnel gain one or more dependent, while the Marines have the lowest rate at just under 22%.

In all services except the Army, the largest race group is white. The largest race group for the Army is unknown, at over 38%. The Navy and Army have slightly higher proportions of black personnel, while Hispanics make up slightly larger proportions of the Marines and Navy. In each of the services, the vast majority are high school graduates or above. Non-high school degree graduates make up around 7% and 6% for the Army and Navy, respectively. The Army also has the highest proportion of personnel

with a college degree, at just below 3%. While Marine and Army AFQT scores both average around 57, the Air Force mean score is around 62 and the Navy mean is just below 51.

The years of marriage vary between the services, but personnel married in 2001 make up the smallest portion for all the services. For occupational specialties, service support makes up the largest proportion for all services except the Navy. The Navy's largest occupational group is combat service, at just over 49%. The smallest portion for the Navy, Army and Air Force is medical service, ranging from around 4% to just under 11%.

3. Combat Exposure Characteristics

Table 3 presents descriptive statistics on combat exposure by service. The table includes the general variables of casualty experience and weapons usage, as well as the specific details of the exposure. Table 4 shows how combat exposure differs across the four occupational specialties.

Table 3. Combat Exposure Characteristics

Combat Exposure	Navy	Marine	Army	Air Force
Overall Casualty Experience	13.88%	42.06%	56.03%	16.03%
	(34.58%)	(49.37%)	(49.64%)	(36.69%)
Overall Weapon Usage	3.04%	16.12%	22.57%	1.37%
	(17.18%)	(36.78%)	(41.81%)	(11.63%)
Type of Casualty Experience				
Witnessed Killed Enemy	4.88%	23.16%	30.91%	4.53%
	(21.54%)	(42.19%)	(46.21%)	(20.79%)
Witnessed Killed Coalition	8.42%	20.87%	31.61%	8.09%
	(27.77%)	(40.64%)	(46.50%)	(27.27%)
Witnessed Killed Civilian	6.17%	15.10%	24.29%	4.18%
	(24.06%)	(35.80%)	(42.88%)	(20.02%)
Entered Destroyed Vehicle	3.37%	21.93%	29.10%	4.17%
	(18.04%)	(41.38%)	(45.43%)	(19.99%)
Type of Weapon Usage				
Fired Weapon from Land	1.68%	14.93%	22.03%	1.16%
	(12.84%)	(35.64%)	(41.44%)	(10.71%)
Fired Weapon from Sea	0.51%	0.04%	0.05%	0.04%
	(7.13%)	(1.94%)	(2.33%)	(1.92%)
Fired Weapon from Air	0.08%	0.20%	0.21%	0.13%
	(2.87%)	(4.47%)	(4.58%)	(3.63%)
Observations	13303	15988	44216	13628
Standard deviations in parentheses				

Table 3 shows the proportions of each service within the sample that were exposed to various types of combat while deployed. A significantly higher proportion of the Army and Marine personnel reported a casualty experience (40% and 60%, respectively), compared to the Navy and Air Force (16% and 14%, respectively). The Army and Marines also have the highest weapons usage, but the rates are substantially lower than casualty experiences. The rates for weapons usage in the Navy and Air Force are very minimal, at 3% and 1.4%, respectively.

The breakdown of casualty experiences varies for each of the services, but witnessing a killed civilian is the least common experience for the Army, Marines and Air Force (ranging from 4% for Air Force to 24% for Army). The rates of personnel who

witnessed killed enemies compared to coalition forces are very similar across the Army and Marines, separated by less than one percentage point for the Army and less than three percentage points for the Marines. Similar to overall casualty experience rates, the proportion of personnel who enter destroyed vehicles is much higher in the Army and Marines.

The overall weapon usage rates for the Navy and Air Force are minimal, and the rates for firing a weapon on land are at 1.7% and 1.2%, respectively. Not surprisingly, the Army has the highest proportion of personnel who fired weapons on land with 22%, followed by the Marines with just below 15%. The rates for firing a weapon from sea or the air are negligible, for all four services.

Table 4. Combat Exposure by Occupational Specialty

	Navy		Marine		Army		Air Force	
Occupational Specialty	Casualty Experience	Weapon Usage	Casualty Experience	Weapon Usage	Casualty Experience	Weapon Usage	Casualty Experience	Weapon Usage
Combat Arms	23.82%	27.65%	47.22%	67.03%	40.02%	58.07%	29.66%	44.92%
	(42.61%)	(44.78%)	(49.93%)	(47.02%)	(49.00%)	(49.35%)	(45.68%)	(49.87%)
Medical Service	49.27%	43.95%	N/A	N/A	9.64%	5.91%	11.12%	1.07%
	(50.01%)	(49.69%)			(29.51%)	(23.58%)	(31.45%)	(10.31%)
Combat Service	25.39%	28.40%	22.98%	15.01%	26.19%	21.84%	24.90%	28.34%
	(43.54%)	(45.15%)	(42.07%)	(35.73%)	(43.97%)	(41.32%)	(43.25%)	(45.19%)
Service Support	28.05%	30.86%	33.08%	20.99%	29.33%	19.38%	28.24%	27.81%
	(44.93%)	(46.25%)	(47.05%)	(40.73%)	(45.53%)	(39.53%)	(45.03%)	(44.93%)
Observations	1847	405	6724	2578	24776	9981	2185	187
Standard deviations in parentheses								

Table 4 shows how combat exposure differs across each occupational specialty, separated by service. This table shows those who reported a casualty experience or weapon usage. For the Marines, Army, and Air Force, personnel in combat arms had the highest rates for both casualty experience and weapon usage. For the Navy, the highest rates for a casualty experience and weapon usage occurred within the medical service (49% and 44%, respectively). This is not surprising, as personnel in the Navy Hospital Corpsman (HM) rating are frequently embedded in Marine combat units. Medical service personnel in the Army and Air Force showed the lowest rates for casualty experiences and weapon usage, compared to the other occupational groups. Across all four services, personnel in service support showed higher rates of casualty experiences than personnel in combat service. Navy and Marine personnel in service support also reported higher rates for weapon usage (31% and 21%, respectively) than their combat service counterparts. However, weapon usage rates for the Army and Air Force in service support (19% and 28%, respectively) were slightly lower than corresponding rates in combat service.

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V. STATISTICAL MODELS

This chapter will describe the models used for statistical analysis. This study will use five models to analyze the effects of combat exposure. Model 1 focuses on the main effect of combat exposure (casualty experience and weapon usage) and the occupational specialty groups (combat arms, medical service, combat service, service support). Model 2 includes interaction terms between combat exposure and occupational specialties. Model 3 includes interaction terms between combat exposure and gender. Model 4 focuses on the effects of combat exposure when the two main exposure variables are separated into more detailed measures. The new measures for casualty experience (witnessing killed civilian/enemy/coalition and entering a destroyed vehicle) and weapon usage (firing from land, sea, or air) are used to create interaction terms with gender. Model 5 includes interaction terms between the specific combat exposure measures and occupational specialty.

A. MODEL DESIGN

In this study, the dependent variable is binary, so a probit model will be used. The probit model will specify how each variable affects the probability of an individual getting divorced, after their deployment.

B. REGRESSION MODELS

1. Model 1

The first model will focus on the overall effect of combat exposure, through the variables for casualty experience and weapon usage. This model also identifies how divorce differs across both occupational specialty and gender. The model will take the following form:

$$\Pr(\text{divorce}) = \beta o + \beta_1(\text{fired weapon during deployment (regardless of location)}) + \beta_2(\text{saw persons wounded or killed, or encountered dead bodies (regardless of situation)}) + \beta_3(\text{other explanatory variables})$$

2. Model 2

The second model will estimate the effects of combat exposure as they differ by occupational specialty. The model will include the primary independent variables for weapon usage and casualty experience, as well as the occupational groups. The variable for casualty experience will capture whether an individual saw a killed or injured person, regardless of their affiliation. Weapon usage captures whether an individual fired a weapon during deployment, regardless of where it was fired. The occupational groups included are medical service, combat service, and service support, with combat arms as the excluded group. The model also includes interaction terms between the two combat exposure variables and each occupational group. The interaction terms are listed below.

a. Interaction Terms

(1) Medical Service * Casualty Experience

(2) Combat Service * Casualty Experience

(3) Service Support * Casualty Experience

(4) Medical Service * Weapons Usage

(5) Combat Service * Weapons Usage

(6) Service Support * Weapons Usage

3. Model 3

The third model estimates the effects of combat exposure and how its effects differ by gender. The same control and primary independent variables are used that were included in the first model. Once again, the omitted occupational group is combat arms. However, this model includes interaction terms between weapon usage and casualty experience, and the variable for female. The interaction terms for this model are listed below.

a. Interaction Terms

(1) Female * Casualty Experience

(2) Female * Weapons Usage

4. Model 4

The fourth model changes substantially from the first three. In this model, the focus is whether combat exposure effects differ when the two independent variables for combat exposure are further broken down. The variable for casualty experience is replaced by the binary variables for witnessing a killed civilian, or witnessing a killed enemy. The excluded variable is witnessing a killed coalition member. The binary variable for inspecting or entering a destroyed military vehicle is also added. The variable for weapon usage is replaced by the binary variables that account for firing a weapon from sea, or firing a weapon from the air. The excluded variable in this case is firing a weapon on land. The model has the same occupational groups as before, and includes interaction terms between the individual combat exposure variables and the variable for female. The interaction terms are listed below.

a. Interaction Terms

(1) Female * Witnessed Killed Enemy

(2) Female * Witnessed Killed Civilian

(3) Female * Entered or inspected destroyed military vehicle

(4) Female * Fired Weapon from sea

(5) Female * Fired Weapon from air

5. Model 5

The final model is a variation on the fourth model, with a minor change. This model focuses on the differences in the broken down combat exposure effects, specifically by occupational specialty. The same variables for specific casualty experiences and weapons usage remain in the model. However, medical service, combat service, and service support are combined into a variable for non-combat specialties. This new variable for non-combat specialties is then interacted with the various combat exposure variables. The interaction terms are listed below.

a. Interaction Terms

(1) Non-combat specialty * Witnessed Killed Enemy

(2) Non-combat specialty * Witnessed Killed Civilian

(3) Non-combat specialty * Entered or inspected destroyed military vehicle

(4) Non-combat specialty * Fired Weapon from sea

(5) Non-combat specialty * Fired Weapon from air

VI. MULTIVARIATE RESULTS

This chapter will present the results of the five models, and provide analysis on significant results. All results presented are marginal effects. For the purposes of this chapter, the tables will only include those control variables which were found to be statistically significant, and all of the combat exposure variables. The complete regression results for each service can be found in the appendices.

A. NAVY PERSONNEL

Table 5 provides the results of all five models for Navy personnel. The analysis will begin with a breakdown on the results for each particular model, followed by general comments on the significant control variables.

Table 5. Navy Regression Results (Marginal Effects)

	Model 1	Model 2	Model 3	Model 4	Model 5
Combat Exposure					
Casualty Experience	0.003	0.02	0.01		
	(0.01)	(0.03)	(0.01)		
Weapon Usage	-0.01	-0.08	-0.01		
	(0.02)	(0.03)†	-0.02		
Witnessed killed enemy				0.03	0.004
				(0.02)	(0.11)
Witnessed killed civilian				-0.01	0.0007
				(0.01)	(0.05)
Entered or inspected destroyed military vehicle				-0.01	-0.15
				(0.02)	(0.003)
Fired a weapon from sea				0.03	-0.12
				(0.05)	(0.002)
Fired a weapon from air				-0.03	-0.03
				(0.08)	(0.08)
Occupational Specialty					
Medical Service	0.02	0.01	0.02	0.02	
	(0.01)	(0.02)	(0.01)†	(0.01)	
Combat Service	0.01	0.02	0.01	0.01	
	(0.01)†	(0.01)*	(0.01)†	(0.01)†	

	Model 1	Model 2	Model 3	Model 4	Model 5
Occupational Specialty					
Service Support	0.03	0.03	0.03	0.03	
	(0.01)**	(0.01)**	(0.01)**	(0.01)**	
Non-combat specialty (medical, combat service, service support)					0.03
					(0.01)*
Demographic Variables					
Female	0.16	0.16	0.17	0.17	0.16
	(0.01)**	(0.01)**	(0.01)**	(0.01)**	(0.01)**
Paygrade (at time of marriage)	0.01	0.01	0.01	0.01	0.01
	(0.003)**	(0.003)**	(0.003)**	(0.003)**	(0.003)**
Change in dependent quantity	-0.06	-0.06	-0.06	-0.06	-0.06
	(0.01)**	(0.01)**	(0.01)**	(0.01)**	(0.01)**
Married in 2001	0.19	0.19	0.2	0.19	0.19
	(0.03)**	(0.03)**	(0.03)**	(0.02)**	(0.02)**
Married in 2002	0.15	0.15	0.15	0.15	0.15
	(0.02)**	(0.02)**	(0.02)**	(0.02)**	(0.02)**
Married in 2003	0.12	0.12	0.12	0.12	0.11
	(0.02)**	(0.02)**	(0.02)**	(0.02)**	(0.02)**
Married in 2004	0.08	0.08	0.08	0.08	0.08
	(0.02)**	(0.02)**	(0.02)**	(0.02)**	(0.02)**
Interaction Terms					
Member of medical service who witnessed casualty		-0.02			
		(0.03)			

	Model 1	Model 2	Model 3	Model 4	Model 5
Interaction Terms					
Member of combat service who witnessed casualty		-0.03			
		(0.02)			
Member of service support who witnessed casualty		-0.01			
		(0.02)			
Member of medical service who fired weapon		0.24			
		(0.13)*			
Member of combat service who fired weapon		0.05			
		(0.07)			
Member of service support who fired weapon		0.12			
		(0.10)			
Female who witnessed casualty			-0.04		
			(0.02)*		
Female who fired weapon			-0.04		
			(0.04)		
Non-combat specialty who witnessed killed enemy					0.02
					(0.12)
Non-combat specialty who witnessed killed civilian					-0.02
					(0.05)
Non-combat specialty who entered or inspected destroyed military vehicle					0.92
					(0.002)
Non-combat specialty who fired weapon from sea					0.89
					(0.002)

	Model 1	Model 2	Model 3	Model 4	Model 5
Interaction Terms					
Female who witnessed killed enemy				-0.05	
				(0.03)	
Female who witnessed killed civilian				-0.02	
				(0.04)	
Female who entered or inspected destroyed military vehicle				-0.04	
				(0.06)	
Female who fired weapon from sea				-0.1	
				(0.02)†	
Observations	13245	13245	13245	13245	13245
Standard errors in parentheses					
† significant at 10%; * significant at 5%; ** significant at 1%					

1. Model 1

The first model focuses on the general effect of combat exposure, and differences in the divorce rate across both occupational specialty and gender. Model 1 indicates no significant results for combat exposure, but it does show that the divorce rate is systematically different across occupational specialties. Both the combat service and service support groups had a higher divorce rate compared to combat arms, by 1 and 3 percentage points, respectively. This model also shows that divorce differs by gender, as women have a higher divorce rate by 16 percentage points.

2. Model 2

The second model for Navy personnel focuses on whether the effect of combat exposure differs by occupational specialty. In this second model, firing a weapon during deployment will decrease the likelihood of divorce by 8 percentage points, significant at the 10% level. The variable that captures the effect of an individual in the medical service firing a weapon has the greatest magnitude. The combined effect of an individual in this occupational group firing a weapon increases the likelihood of divorce by 17 percentage points. However, despite the magnitude, this overall effect (i.e., joint hypothesis for medical service, weapon usage, and interaction between the two) is not statistically significant (p-value = 0.1095).

3. Model 3

Model 1 shows that females have a much higher probability of divorce compared to males, holding all other factors constant. The third model focuses on whether the effect of combat exposure on divorce is different between men and women, by adding interaction terms between the two primary combat exposure variables and the variable for female. There is little change to the effects of the occupational specialties, except that medical service is significant at the 10% level with a positive effect on divorce of 2 percentage points. The main effect of female in Model 3 is still statistically significant and the coefficient indicates that a female who has no combat exposure has a probability of divorce 17 percentage points higher than a male with no combat exposure. The

interaction term between female and casualty experience is -.03, which indicates that witnessing a casualty as a female will increase the likelihood of divorce by 14 percentage points, which is jointly significant (p-value = 0.0003).

4. Model 4

The fourth model breaks down the variables for casualty experience and weapons usage into the more specific measures of combat exposure. These new measures of combat were interacted with the variable female in order to observe any differences across gender. There is little change in the occupational specialty variables from the previous models. The model finds no statistically significant results for witnessing killed enemies or civilians, but the interaction term between female and firing a weapon from sea is significant at the 10% level. The marginal effect of this interaction is an increase in the likelihood of divorce by 10 percentage points. However, this effect does not prove to be jointly significant (p-value = 0.5733).

5. Model 5

The final model uses the detailed combat exposure variables to create interaction terms with occupational groups. For this model, medical service, combat service, and service support are grouped into one category identified as non-combat specialties. The non-combat group is found significant at the 5% level, with a positive effect on divorce of 3 percentage points. None of the combat exposure measures or interaction terms are found to be statistically significant in this model.

6. Control Variables

The results of all four models present some interesting findings on some of the control variables that affect divorce. Gender has the most substantial effect on divorce for Navy personnel. Dependent on the model, a female has a predicted divorce rate 16 to 17 percentage points higher than a male counterpart. Since the baseline Navy divorce rate is around 12.5%, being a female more than doubles one's predicted divorce rate. In all of the models, each additional increase in paygrade at the time of marriage will increase the probability of divorce by 1 percentage point. Not surprisingly, the variable

for change in dependent quantity had a fairly substantial effect, decreasing the likelihood of divorce by 6 percentage points in all four of the models. Compared to 2005, Navy personnel married in 2001 had the highest likelihood of divorce, with a decreasing effect each year from 2001 to 2004.

B. MARINE PERSONNEL

Table 6 provides regression results for Marine personnel. The discussion will cover the specifics of each model, followed by the significant control variables.

Table 6. Marine Regression Results (Marginal Effects)

	Model 1	Model 2	Model 3	Model 4	Model 5
Combat Exposure					
Casualty Experience	0.01	0.02	0.01		
	(0.01)	(0.01)*	(0.01)		
Weapon Usage	-0.01	-0.02	-0.01		
	(0.01)	(0.01)†	(0.01)		
Witnessed killed enemy				0.002	0.01
				(0.01)	(0.01)
Witnessed killed civilian				-0.01	-0.01
				(0.01)	(0.01)
Entered or inspected destroyed military vehicle				-0.01	0.004
				(0.01)	(0.01)
Occupational Specialty					
Combat Service	0.01	0.02	0.01	0.01	
	(0.01)*	(0.01)*	(0.01)*	(0.01)	
Service Support	0.02	0.03	0.02	0.02	
	(0.01)**	(0.01)**	(0.01)**	(0.01)**	
Non-combat specialty (combat service, service support)					0.02
					(0.01)**
Demographic Variables					
Female	0.13	0.13	0.14	0.13	0.13
	(0.02)**	(0.02)**	(0.02)**	(0.02)**	(0.02)**

	Model 1	Model 2	Model 3	Model 4	Model 5
Demographic Variables					
Paygrade (at time of marriage)	0.01	0.01	0.01	0.01	0.01
	(0.003)*	(0.003)*	(0.003)*	(0.003)*	(0.003)†
Change in dependent quantity	-0.04	-0.04	-0.04	-0.04	-0.04
	(0.005)**	(0.005)**	(0.005)**	(0.005)**	(0.005)**
Hispanic	-0.02	-0.02	-0.02	-0.02	-0.02
	(0.01)*	(0.01)*	(0.01)*	(0.01)**	(0.01)*
Unknown race	0.01	0.01	0.01	0.01	0.01
	(-0.01)†	(0.01)	(0.01)†	(0.01)	(0.01)
High school graduate or above	0.02	0.02	0.02	0.02	0.02
	(0.01)†	(0.01)†	(0.01)†	(0.01)†	(0.01)†
Married in 2001	0.08	0.08	0.08	0.08	0.08
	(0.01)**	(0.01)**	(0.01)**	(0.01)**	(0.01)**
Married in 2002	0.08	0.08	0.08	0.08	0.08
	(0.01)**	(0.01)**	(0.01)**	(0.01)**	(0.01)**
Married in 2003	0.07	0.07	0.07	0.07	0.07
	(0.01)**	(0.01)**	(0.01)**	(0.01)**	(0.01)**
Married in 2004	0.04	0.04	0.04	0.04	0.04
	(0.01)**	(0.01)**	(0.01)**	(0.01)**	(0.01)**
Interaction Terms					
Member of combat service who witnessed casualty		-0.01			
		(0.01)			
Member of service support who witnessed casualty		-0.02			
		(0.01)*			

	Model 1	Model 2	Model 3	Model 4	Model 5
Interaction Terms					
Member of combat service who fired weapon		-0.01			
		(0.02)			
Member of service support who fired weapon		0.03			
		(0.02)			
Female who witnessed casualty			-0.02		
			(0.02)		
Female who fired weapon			0.02		
			(0.07)		
Non-combat specialty who witnessed killed enemy					-0.01
					(0.01)
Non-combat specialty who witnessed killed civilian					0.01
					(0.02)
Non-combat specialty who entered or inspected destroyed military vehicle					-0.02
					(0.01)
Female who witnessed killed enemy				-0.03	
				(0.02)	
Female who witnessed killed civilian				0.05	
				(0.06)	
Female who entered or inspected destroyed military vehicle				0.01	
				(0.04)	
Observations	15847	15847	15847	15811	15811
Standard errors in parentheses					
† significant at 10%; * significant at 5%; ** significant at 1%					

1. Model 1

The first model focuses on the general effect of combat exposure, and identifies how the divorce rate differs across both occupational specialty and gender. The two combat exposure variables are not found to be statistically significant in this model. Model 1 does show that the divorce rate is different across occupational specialties. Compared to combat arms, the divorce rate for combat service is 1 percentage point higher, while service support is 2 percentage points higher. Divorce also differs by gender, as women will have a divorce rate 13 percentage points higher.

2. Model 2

The second model uses the variables for casualty experience and weapons usage to create interaction terms with the occupational groups. For the Marines, there is no group for medical service. The variables for casualty experience and weapons usage represent the effects for the combat arms group, and both are significant. A casualty experience increases the divorce rate by 2 percentage points, while weapons usage decreases the rate by 2 percentage points. Compared to combat arms, Marines in combat service have a divorce likelihood 2 percentage points higher, and those in service support are 3 percentage points higher. The only interaction term which proved significant in this model captures the effect of a Marine in service support who witnesses a casualty. The marginal effect comes out to a positive effect of 3 percentage points, which is jointly significant (p-value = 0.0021).

3. Model 3

The third model uses interaction terms with the primary combat exposure variables and gender. In this model, casualty experience and weapons usage are not statistically significant. The occupational group effects are similar, except that the variables for combat service and service support are each one percentage point smaller than the first model. The interaction terms between female and combat exposure are not significant.

4. Model 4

The fourth model uses the more specific measures of combat exposure, and interacts them with gender. The occupational group combat service is not significant, but service support is significant with a positive effect on divorce of 2 percentage points. As with the previous model, none of the combat measures or interactions are statistically significant.

5. Model 5

The fifth model uses interaction terms between the specific combat measures and occupational groups. In this model, combat service and service support are grouped together as non-combat specialties. The variable for non-combat specialties itself is significant at the 1% level, and it increases the likelihood of divorce by 2 percentage points. None of the combat exposure variables or interaction terms proved to be statistically significant.

6. Control Variables

The control variables proved to have some of the most substantial effects within the Marine models. Although slightly lower than the Navy models, the variable for female had a very large positive effect on the likelihood of divorce. The effect of female ranged from 13 to 14 percentage points across the models, at the 1% significance level. The effects of paygrade and change in dependent quantity were very similar to what was seen in the Navy models. Compared to whites, Hispanics averaged a divorce rate 2 percentage points lower. Those who were high school graduates or above had a predicted divorce likelihood 2 percentage points higher, compared to non-high school graduates.

C. ARMY PERSONNEL

Table 7 presents regression results for Army personnel. The discussion will address the aspects of each model, followed by an overview of significant control variables.

Table 7. Army Regression Results (Marginal Effects)

	Model 1	Model 2	Model 3	Model 4	Model 5
Combat Exposure					
Casualty Experience	0.01	0.01	0.01		
	(0.003)*	(0.01)	(0.003)**		
Weapon Usage	-0.01	-0.01	-0.01		
	(0.003)**	(0.01)**	(0.003)**		
Witnessed killed enemy				-0.0002	0.002
				(0.003)	(0.01)
Witnessed killed civilian				0.0004	0.002
				(0.004)	(0.01)
Entered or inspected destroyed military vehicle				-0.004	-0.01
				(0.003)	(0.01)
Fired a weapon from sea				0.08	-0.07
				(0.08)	(0.001)
Fired a weapon from air				-0.02	-0.04
				(0.03)	(0.04)
Occupational Specialty					
Medical Service	0.03	0.03	0.03	0.03	
	(0.01)**	(0.01)*	(0.01)**	(0.01)**	
Combat Service	0.01	0.01	0.01	0.01	
	(0.003)**	(0.01)*	(0.003)**	(0.003)**	
Service Support	0.03	0.02	0.03	0.03	
	(0.003)**	(0.01)**	(0.003)**	(0.003)**	

	Model 1	Model 2	Model 3	Model 4	Model 5
Occupational Specialty					
Non-combat specialty (medical, combat service, service support					0.02
					(0.004)**
Demographic Variables					
Female	0.11	0.11	0.11	0.1	0.11
	(0.01)**	(0.01)**	(0.01)**	(0.01)**	(0.01)**
Paygrade (at time of marriage)	0.01	0.01	0.01	0.01	0.01
	(0.001)**	(0.001)**	(0.001)**	(0.001)**	(0.001)**
Change in dependent quantity	-0.03	-0.03	-0.03	-0.03	-0.03
	(0.003)**	(0.003)**	(0.003)**	(0.003)**	(0.003)**
Unknown race	0.01	0.01	0.01	0.01	0.01
	(0.004)**	(0.004)**	(0.004)**	(0.004)**	(0.004)**
High school graduate or above	0.01	0.01	0.01	0.01	0.01
	(0.004)†	(0.004)†	(0.004)†	(0.004)†	(0.004)†
College Degree	-0.02	-0.02	-0.02	-0.02	-0.02
	(0.01)*	(0.01)*	(0.01)*	(0.01)*	(0.01)*
Married in 2001	0.09	0.09	0.09	0.1	0.1
	(0.01)**	(0.01)**	(0.01)**	(0.01)**	(0.01)**
Married in 2002	0.09	0.09	0.09	0.09	0.09
	(0.01)**	(0.01)**	(0.01)**	(0.01)**	(0.01)**
Married in 2003	0.08	0.08	0.08	0.08	0.08
	(0.01)**	(0.01)**	(0.01)**	(0.01)**	(0.01)**
Married in 2004	0.04	0.04	0.04	0.04	0.04
	(0.005)**	(0.005)**	(0.005)**	(0.005)**	(0.005)**

	Model 1	Model 2	Model 3	Model 4	Model 5
Interaction Terms					
Member of medical service who witnessed casualty		-0.004			
		(0.01)			
Member of combat service who witnessed casualty		-0.0006			
		(0.01)			
Member of service support who witnessed casualty		0.001			
		(0.01)			
Member of medical service who fired weapon		-0.003			
		(0.01)			
Member of combat service who fired weapon		-0.00003			
		(0.01)			
Member of service support who fired weapon		0.02			
		(0.01)*			
Female who witnessed casualty			-0.01		
			(0.01)		
Female who fired weapon			0.01		
			(0.02)		
Non-combat specialty who witnessed killed enemy					-0.003
					(0.01)
Non-combat specialty who witnessed killed civilian					-0.003
					(0.01)
Non-combat specialty who entered or inspected destroyed military vehicle					0.003
					(0.01)

	Model 1	Model 2	Model 3	Model 4	Model 5
Interaction Terms					
Non-combat specialty who fired weapon from sea					0.93
					(0.001)
Non-combat specialty who fired weapon from air					0.12
					(0.15)
Female who witnessed killed enemy				0.0005	
				(0.01)	
Female who witnessed killed civilian				-0.01	
				(0.01)	
Female who entered or inspected destroyed military vehicle				0.01	
				(0.01)	
Female who fired weapon from air				0.57	
				(0.26)**	
Observations	43939	43939	43939	43939	43939
Standard errors in parentheses					
† significant at 10%; * significant at 5%; ** significant at 1%					

1. Model 1

The first model focuses on the general effects of combat exposure, identified by the variables for casualty experience and weapon usage. It also looks at divorce differences across occupational specialty and gender. Both casualty experience and weapon usage are found to be significant in this model. A casualty experience increases the divorce rate by 1 percentage point, while weapon usage decreases it by 1 percentage point. Compared to combat arms, medical service and service support both indicate a divorce rate 3 percentage points higher, while combat service increases divorce by 1 percentage point. As seen with the Navy and Marines, the effect of gender is considerable. A female in the Army will have a divorce rate 11 percentage points higher than her male counterpart.

2. Model 2

The second model includes the two primary combat exposure variables, and interaction terms with occupational specialties. The variable for weapon usage is significant, so personnel in combat arms who discharge a weapon have a likelihood of divorce 1 percentage point lower. The only other combat measure that was significant was the variable for a member of service support who fired their weapon. The marginal effect for this variable is an increase of 2 percentage points, which is jointly significant (p-value =0.0029).

3. Model 3

The third model uses the two primary combat exposure variables and creates interaction terms to account for differences in gender. This model finds both casualty experience and weapon usage significant at the 1% level, with effects of positive 1 percentage point and negative 1 percentage point, respectively. The two gender interaction terms in this model are not found to be significant.

4. Model 4

The fourth model breaks combat exposure down into the detailed measures as previously mentioned, and uses them to create interaction terms with gender. The one combat measure that is significant has the largest effect of any variable in the models, regardless of service. The variable for a female that fires a weapon from the air is significant at the 1% level. The marginal effect for this experience is 65 percentage points, and it is jointly significant (p-value = 0.0006). However, this estimate is unreliable since this experience includes only 5 observations.

5. Model 5

The final model uses the detailed combat exposure measures to create interaction terms with occupational groups. Medical service, combat service, and service support are merged into the group non-combat specialty. The variable for non-combat specialty is significant at the 1% level, and the effect increases the likelihood of divorce by 2 percentage points. None of the combat exposure measures or interaction terms in this model are significant.

6. Control Variables

Once again, female is the most substantial control variable, with the effect ranging from a positive 10 to 11 percentage points across the models. Paygrade and change in dependent quantity have similar effects to those seen with the Navy and Marines. While a high school degree or above increases divorce by 1 percentage point, interestingly, possessing a college degree actually decreases the likelihood of divorce by 2 percentage points.

D. AIR FORCE PERSONNEL

Table 8 presents regression results for Air Force personnel. The discussion includes a review of each model, followed by a look at significant control variables.

Table 8. Air Force Regression Results (Marginal Effects)

	Model 1	Model 2	Model 3	Model 4	Model 5
Combat Exposure					
Casualty Experience	0.01	0.003	0.01		
	(0.01)	(0.01)	(0.01)		
Weapon Usage	0.01	0.05	0.02		
	(0.03)	(0.04)	(0.03)		
Witnessed killed enemy				0.04	0.001
				(0.02)	(0.03)
Witnessed killed civilian				-0.01	0.001
				(0.02)	(0.03)
Entered or inspected destroyed military vehicle				-0.02	0.01
				(0.02)	(0.03)
Fired a weapon from air				-0.04	0.25
				(0.08)	(0.35)
Occupational Specialty					
Medical Service	0.02	0.02	0.02	0.02	
	(0.02)	(0.02)	(0.02)	(0.02)	
Combat Service	0.004	0.003	0.003	0.002	
	(0.01)	(0.01)	(0.01)	(0.01)	

	Model 1	Model 2	Model 3	Model 4	Model 5
Occupational Specialty					
Service Support	0.01	0.01	0.01	0.01	

	(0.01)*	(0.01)	(0.01)*	(0.01)	
Non-combat specialty (medical, combat service, service support)					0.01
					(0.01)
Demographic Variables					
Female	0.12	0.12	0.12	0.12	0.12
	(0.01)**	(0.01)**	(0.01)**	(0.01)**	(0.01)**
Age (at time of marriage)	-0.01	-0.01	-0.01	-0.01	-0.01
	(0.001)**	(0.001)**	(0.001)**	(0.001)**	(0.001)**
Change in dependent quantity	-0.1	-0.1	-0.1	-0.1	-0.1
	(0.01)**	(0.01)**	(0.01)**	(0.01)**	(0.01)**
Married in 2001	0.23	0.23	0.23	0.23	0.23
	(0.02)**	(0.02)**	(0.02)**	(0.02)**	(0.02)**
Married in 2002	0.19	0.19	0.19	0.19	0.19
	(0.02)**	(0.02)**	(0.02)**	(0.02)**	(0.02)**
Married in 2003	0.13	0.13	0.13	0.13	0.13
	(0.01)**	(0.01)**	(0.01)**	(0.01)**	(0.01)**
Married in 2004	0.09	0.09	0.09	0.09	0.09
	(0.01)**	(0.01)**	(0.01)**	(0.01)**	(0.01)**
Interaction Terms					
Member of medical service who witnessed casualty		0.01			
		(0.03)			
Member of combat service who witnessed casualty		0.002			
		(0.02)			
	Model 1	Model 2	Model 3	Model 4	Model 5
Interaction Terms					
Member of service support who		0.02			

witnessed casualty		(0.02)			
Member of combat service who fired weapon		-0.04			
		(0.05)			
Member of service support who fired weapon		-0.05			
		(0.04)			
Female who witnessed casualty			0.01		
			(0.02)		
Female who fired weapon			-0.05		
			(0.06)		
Non-combat specialty who witnessed killed enemy					0.01
					(0.03)
Non-combat specialty who witnessed killed civilian					-0.003
					(0.03)
Non-combat specialty who entered or inspected destroyed military vehicle					-0.01
					(0.03)
Non-combat specialty who fired weapon from air					-0.11
					(0.03)
Female who witnessed killed enemy				-0.09	
				(0.02)**	
Female who witnessed killed civilian				0.07	
				(0.05)	

	Model 1	Model 2	Model 3	Model 4	Model 5
Interaction Terms					
Female who entered or inspected				0.13	

destroyed military vehicle				(0.06)*	
Female who fired weapon from air				0.33	
				(0.42)	
Observations	13602	13600	13602	13597	13597
Standard errors in parentheses					
* significant at 5%; ** significant at 1%					

1. Model 1

The first model focuses on general effects of combat exposure on divorce, using the variables for casualty experience and weapon usage. Model 1 also shows the differences in the divorce rate across occupational specialty and gender. The two combat exposure measures are not significant. The occupational specialty variables indicate that personnel in service support will have a divorce rate 1 percentage point higher, compared to those in combat arms. Once again, gender has a sizable effect as women will see a divorce rate 12 percentage points higher than men.

2. Model 2

The second model uses the general combat exposure measures of casualty experience and weapon usage, and creates interaction terms with occupational specialties. In this model, the only variables that are significant are the control variables. There are no significant findings for combat exposure or occupational specialties.

3. Model 3

The third model used the primary combat exposure variables to create interactions with gender. As with the previous model, there are no significant findings related to combat exposure. Aside from control variables, the only significant variable is for personnel in service support. This variable is significant at the 5% level, and predicts that an individual in service support will have a higher divorce likelihood by 1 percentage point.

4. Model 4

The fourth model breaks down the combat exposure variables into more specific measures, and uses these new measures to create interaction terms based on gender. In this model, two of the interaction terms prove to be statistically significant. The variable for a female who witnessed a killed enemy has a marginal effect of a positive 7 percentage points on divorce, but this is not jointly significant (p-value = 0.8666). The variable that captures the effect of a female inspecting or entering a destroyed military

vehicle has a marginal effect that increases the likelihood of divorce by 23 percentage points. This variable is jointly significant (p-value =0.0000).

5. Model 5

The final model uses the specific combat measurements and creates an interaction with occupational specialty. The occupational groups of medical service, combat service, and service support are grouped together as one variable named non-combat specialty. Similar to Model 1, the only significant variables in this model are control variables. There are no significant findings on combat exposure or occupational specialty.

6. Control Variables

As the significant results related to combat exposure were limited, the control variables play a sizable role in the divorce predictions for the Air Force models. As with the other three services, the variable for female has a considerable effect, with an increase divorce of 12 percentage points across all the models. Change in dependent quantity still has a negative effect on divorce, but the effect is smaller than seen in the other services. The marriage cohorts have the largest effect of any service, as those married in 2001 have a predicted divorce rate 23 percentage points higher, compared to 2005. The effect is diminishing from 2001 to 2004, similar to the other services.

E. SUMMARY

The models for Navy personnel find significant results for the combat arms specialty and the female-casualty interaction. Model 2 finds that personnel in combat arms actually decrease (8 percentage points) their divorce rate when firing a weapon while deployed. Model 3 indicates that a female who witnesses a casualty increases her likelihood of divorce, but the effect is to a lesser degree than a female with no combat exposure. A female who witnesses a casualty has a predicted divorce increase of 14 percentage points, compared to an increase of 17 percentage points for a female with no combat exposure.

The models for Marine personnel find significant results for the combat arms specialty and the service support-casualty interaction, all within Model 2. In this model,

the variables for casualty experience and weapon usage indicate the effects for personnel in the combat arms specialty. A casualty experience will increase the divorce rate by 2 percentage points, while weapon usage will actually decrease divorce by 2 percentage points. The interaction term finds that an individual in service support who witnesses a casualty will have a predicted divorce rate 3 percentage points higher, compared to personnel in combat arms with no combat exposure.

The Army models present significant findings for the overall effects of casualty experience and weapon usage, firing a weapon in combat arms, and the service support-weapon interaction. In Model 1, the overall effect of a casualty experience increases the likelihood of divorce by 1 percentage point, while the overall effect of weapon usage decreases divorce by 1 percentage point. Model 2 finds that personnel in combat arms who fire a weapon have a lower divorce rate by 1 percentage point, while individuals in service support who fire a weapon will have an increased divorce rate by 2 percentage points.

The Air Force models presented significant findings in only one area, the interaction between female and destroyed vehicles. Model 4 finds that a female who inspects or enters destroyed military vehicles increases her likelihood of divorce by 23 percentage points.

VII. CONCLUSION AND RECOMMENDATIONS

A. CONCLUSION

This study used five probit models to determine how combat exposure, in various forms, affects the divorce rate for enlisted personnel in the military. Furthermore, it explored how combat exposure relates to both occupational specialty and gender. This conclusion will focus on the findings in relation to the research questions.

The first primary question addressed how combat exposure during a deployment affects the enlisted divorce rate. The results have shown that in most cases, combat exposure will increase the likelihood of divorce. In all the models, a total of 11 combat exposure variables or interaction terms were found to be statistically significant. Of these 11 variables, 7 were found to have a positive effect on divorce. The 4 experiences that had a negative effect on the divorce rate were all related to weapons usage. From these results, we can presume that casualty experiences have a greater impact on divorce than firing one's weapon during deployment.

The second primary question was aimed at determining whether the combat exposure effect differed by specialty. Based on the results, weapons usage had a positive effect on divorce for personnel in both medical service and service support, while it actually had a negative effect on divorce for personnel in combat arms. On the other hand, a casualty experience was found to have a positive effect on divorce for individuals in both service support and combat arms.

The secondary research question was related to differences in effects across the types of combat exposure. The primary variables of casualty experience and weapon usage were broken down to provide more information on the type of exposure. For the Air Force, it was found that females witnessing a killed enemy had an increased divorce rate of 7 percentage points. However, females who inspected or entered a destroyed military vehicle had an estimated divorce rate 23 percentage points higher, an effect over three times that of witnessing a killed enemy. The remaining results for the various types

of exposure do not provide enough detail or variation. Since there were limited findings in this third area, it is difficult to make any definitive conclusions.

Although unrelated to the research questions, some of the most notable predictors of divorce were contained within the control variables. In every model, women had a markedly higher predicted divorce rate. For most services, the coefficient for female more than doubled the baseline divorce rate. Not surprisingly, a change in dependent quantity, which would normally indicate a child, decreased the likelihood of divorce by anywhere from 1 to 6 percentage points. For Army personnel, possessing a college degree or higher actually decreased the likelihood of divorce by 2 percentage points. This is particularly interesting because Army personnel in the sample have the highest rate of combat exposure, in both casualty experiences and weapon usage.

B. LIMITATIONS

This study had a few limitations due to data availability. First, the data on combat exposure are entirely self-reported. Although the PDHA is likely the best way to obtain this information, there may be inaccuracies that can affect the results. For example, individuals may fail to report experiences due to fear that they will receive unwanted pressure for counseling or other services. Although the PDHA explicitly states that completing the form will not delay a member's return home, there may be some individuals who still fear a delay.

Another limitation is that the PDHA does not request that personnel rate the intensity of their combat experiences. Some past studies on military personnel during Vietnam classified combat exposure as light, medium, or heavy. Although this would be an entirely subjective measure, it could help to identify those who have experienced particularly heavy combat situations.

A final limitation of this study is the demographic data. Past research suggests that an individual's history may play a significant role in how that person deals with traumatic experiences. Studies cite issues such as pre-existing mental health conditions, problems in school, and socioeconomic status. These types of data may be difficult to procure for privacy reasons, or potentially may not be recorded by the DoD.

C. RECOMMENDATIONS

It is important to continue to effectively track combat exposure among deployed military personnel, and how it may affect their lives after deployment ends. Many services exist to assist military personnel with family issues, specifically those related to deployment.

This study may help to identify groups at high risk for divorce and possibly increase targeting to these individuals. The findings here confirm what other studies have found, that women in the military are at the greatest risk of divorce. Combat experiences may further amplify these effects, as has been found here. It also appears that non-combat personnel, such as those in service support or medical fields, may be strongly impacted by combat experiences. Many of the measures for combat exposure more severely affect these individuals, as compared to those serving in combat arms.

Organizations that provide family services to military personnel, such as the Fleet and Family Support Program may want to design new programs or focus current ones increasingly on women. Additionally, commands that deal with large numbers of deployed personnel should remain aware of potentially at-risk groups and ensure they have access to the resources to assist them.

On the reporting side, the AFHSC should continue to aggressively track combat exposure among military personnel. This may include experimenting with tracking measures, namely through the PDHA. One possibility may be to include a scale in which personnel can rate the intensity of a combat experience, in order to gain the maximum amount of detail about a given experience.

Combat exposure is a byproduct of our military's mission, and it is important that we strive to learn as much as possible about how it affects our personnel and their lives.

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APPENDIX A. OCCUPATIONAL GROUPS

Table 9 shows how the occupational codes for each service were arranged into the four groups of combat arms, medical service, combat service, and service support. For a detailed description of each code by occupational title, refer to the DoD Occupational Conversion Index (DoD 1312.1-I).

Table 9. Occupational Code Grouping

Occupational Group	Service Occupational Code
Navy	
Combat Arms	BM01, FC11, FC13, GM08, MN12, OS03, QM02, TM07
Medical Service	DT87, HM84
Combat Service	DC48, EN43, EM33, EM46, EO57, ET14, ET15, ET16, ET17, ET33, ET47, FT11, FT13, FC16, GS41, IC47, IS39, MM33, MM42, MM45, MR44, MT33
Service Support	BU59, CE56, CM58, DK29, HT49, IT23, IT27, JO32, LI36, MA20, MS35, MU38, NC21, PH81, PN26, RP24, SH31, SK28, SW60, UT61, YN25
Marines	
Combat Arms	03, 08, 13, 18
Combat Service	05, 06, 21, 23, 25, 26, 28, 57
Service Support	01, 02, 04, 09, 11, 27, 30, 31, 33, 34, 35, 40, 41, 43, 44, 46, 55, 58, 59

Army	
Combat Arms	11, 12, 13, 14, 18, 21
Medical Service	60, 61, 62, 63, 64, 65, 66, 67
Combat Service	25, 31, 35, 74
Service Support	27, 36, 42, 44, 88, 89, 91, 92, 94
Air Force	
Combat Arms	1A, 1B, 1C, 1N, 1T, 1S, 1W
Medical Service	4X, 4Y
Combat Service	3C, 3S, 8A, 8R, 2E, 2W, 3E
Service Support	2A, 2F, 2G, 2M, 2P, 2R, 2S, 2T, 3A, 3H, 3M, 3N, 3P, 3U, 3V, 5J, 5R, 6C, 6F, 7S, 8C

APPENDIX B. NAVY COMPLETE REGRESSION RESULTS

Table 10. Navy Regression Results (Marginal Effects)

	Model 1	Model 2	Model 3	Model 4	Model 5
Casualty Experience	0.003	0.02	0.01		
	(0.01)	(0.03)	(0.01)		
Weapon Usage	-0.01	-0.08	-0.01		
	(0.02)	(0.03)†	-0.02		
Female	0.16	0.16	0.17	0.17	0.16
	(0.01)**	(0.01)**	(0.01)**	(0.01)**	(0.01)**
Age (at time of marriage)	-0.003	-0.003	-0.003	-0.003	-0.003
	(0.001)**	(0.001)**	(0.001)**	(0.001)**	(0.001)**
Paygrade (at time of marriage)	0.01	0.01	0.01	0.01	0.01
	(0.003)**	(0.003)**	(0.003)**	(0.003)**	(0.003)**
Change in dependent quantity	-0.06	-0.06	-0.06	-0.06	-0.06
	(0.01)**	(0.01)**	(0.01)**	(0.01)**	(0.01)**
Black	-0.01	-0.01	-0.01	-0.01	-0.01
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Other race	-0.02	-0.02	-0.02	-0.02	-0.02
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Hispanic	-0.01	-0.01	-0.01	-0.01	-0.01
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Unknown race	0.004	0.003	0.004	0.003	0.003
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
High school graduate or above	0.01	0.01	0.01	0.01	0.01
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
College Degree	-0.004	-0.004	-0.004	-0.005	-0.01
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
AFQT	-0.00003	-0.00004	-0.00003	-0.00003	-0.00002
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Married in 2001	0.19	0.19	0.2	0.19	0.19
	(0.03)**	(0.03)**	(0.03)**	(0.02)**	(0.02)**
Married in 2002	0.15	0.15	0.15	0.15	0.15
	(0.02)**	(0.02)**	(0.02)**	(0.02)**	(0.02)**
Married in 2003	0.12	0.12	0.12	0.12	0.11
	(0.02)**	(0.02)**	(0.02)**	(0.02)**	(0.02)**

	Model 1	Model 2	Model 3	Model 4	Model 5
Married in 2004	0.08	0.08	0.08	0.08	0.08
	(0.02)**	(0.02)**	(0.02)**	(0.02)**	(0.02)**
Medical Service	0.02	0.01	0.02	0.02	
	(0.01)	(0.02)	(0.01)†	(0.01)	
Combat Service	0.01	0.02	0.01	0.01	
	(0.01)†	(0.01)*	(0.01)†	(0.01)†	
Service Support	0.03	0.03	0.03	0.03	
	(0.01)**	(0.01)**	(0.01)**	(0.01)**	
Member of medical service who witnessed casualty		-0.02			
		(0.03)			
Member of combat service who witnessed casualty		-0.03			
		(0.02)			
Member of service support who witnessed casualty		-0.01			
		(0.02)			
Member of medical service who fired weapon		0.24			
		(0.13)*			
Member of combat service who fired weapon		0.05			
		(0.07)			
Member of service support who fired weapon		0.12			
		(0.10)			
Female who witnessed casualty			-0.04		
			(0.02)*		
Female who fired weapon			-0.04		
			(0.04)		
Witnessed killed enemy				0.03	0.004
				(0.02)	(0.11)
Witnessed killed civilian				-0.01	0.0007
				(0.01)	(0.05)
Entered or inspected destroyed military vehicle				-0.01	-0.15
				(0.02)	(0.004)

	Model 1	Model 2	Model 3	Model 4	Model 5
Fired a weapon from sea				0.03	-0.12
				(0.05)	(0.003)
Fired a weapon from air				-0.03	-0.03
				(0.08)	(0.08)
Non-combat specialty (medical, combat service, service support)					0.03
					(0.01)*
Non-combat specialty who witnessed killed enemy					0.02
					(0.12)
Non-combat specialty who witnessed killed civilian					-0.02
					(0.05)
Non-combat specialty who entered or inspected destroyed military vehicle					0.92
					(0.002)
Non-combat specialty who fired weapon from sea					0.89
					(0.003)
Female who witnessed killed enemy				-0.05	
				(0.03)	
Female who witnessed killed civilian				-0.02	
				(0.04)	
Female who entered or inspected destroyed military vehicle				-0.04	
				(0.06)	
Female who fired weapon from sea				-0.1	
				(0.02)†	
Observations	13245	13245	13245	13245	13245
Standard errors in parentheses					
† significant at 10%; * significant at 5%; ** significant at 1%					

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APPENDIX C. MARINE COMPLETE REGRESSION RESULTS

Table 11. Marine Regression Results (Marginal Effects)

	Model 1	Model 2	Model 3	Model 4	Model 5
Casualty Experience	0.01	0.02	0.01		
	(0.01)	(0.01)*	(0.01)		
Weapon Usage	-0.01	-0.02	-0.01		
	(0.01)	(0.01)†	(0.01)		
Female	0.13	0.13	0.14	0.13	0.13
	(0.02)**	(0.02)**	(0.02)**	(0.02)**	(0.02)**
Age (at time of marriage)	-0.002	-0.002	-0.002	-0.002	-0.002
	(0.001)*	(0.001)*	(0.001)*	(0.001)*	(0.001)*
Paygrade (at time of marriage)	0.01	0.01	0.01	0.01	0.01
	(0.003)*	(0.003)*	(0.003)*	(0.003)*	(0.003)†
Change in dependent quantity	-0.04	-0.04	-0.04	-0.04	-0.04
	(0.005)**	(0.005)**	(0.005)**	(0.005)**	(0.005)**
Black	0.01	0.01	0.01	0.01	0.01
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Other race	-0.01	-0.01	-0.01	-0.01	-0.01
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Hispanic	-0.02	-0.02	-0.02	-0.02	-0.02
	(0.01)*	(0.01)*	(0.01)*	(0.01)**	(0.01)*
Unknown race	0.01	0.01	0.01	0.01	0.01
	(-0.01)†	(0.01)	(0.01)†	(0.01)	(0.01)
High school graduate or above	0.02	0.02	0.02	0.02	0.02
	(0.01)†	(0.01)†	(0.01)†	(0.01)†	(0.01)†
College Degree	0.05	0.05	0.05	0.05	0.05
	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)
AFQT	-0.00004	-0.00004	-0.00004	-0.00005	-0.00006
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	0.0001
Married in 2001	0.08	0.08	0.08	0.08	0.08
	(0.01)**	(0.01)**	(0.01)**	(0.01)**	(0.01)**
Married in 2002	0.08	0.08	0.08	0.08	0.08
	(0.01)**	(0.01)**	(0.01)**	(0.01)**	(0.01)**
Married in 2003	0.07	0.07	0.07	0.07	0.07
	(0.01)**	(0.01)**	(0.01)**	(0.01)**	(0.01)**

	Model 1	Model 2	Model 3	Model 4	Model 5
Married in 2004	0.04	0.04	0.04	0.04	0.04
	(0.01)**	(0.01)**	(0.01)**	(0.01)**	(0.01)**
Combat Service	0.01	0.02	0.01	0.01	
	(0.01)*	(0.01)*	(0.01)*	(0.01)	
Service Support	0.02	0.03	0.02	0.02	
	(0.01)**	(0.01)**	(0.01)**	(0.01)**	
Member of combat service who witnessed casualty		-0.01			
		(0.01)			
Member of service support who witnessed casualty		-0.02			
		(0.01)*			
Member of combat service who fired weapon		-0.01			
		(0.02)			
Member of service support who fired weapon		0.03			
		(0.02)			
Female who witnessed casualty			-0.02		
			(0.02)		
Female who fired weapon			0.02		
			(0.07)		
Witnessed killed enemy				0.002	0.01
				(0.01)	(0.01)
Witnessed killed civilian				-0.01	-0.01
				(0.01)	(0.01)
Entered or inspected destroyed military vehicle				-0.01	0.004
				(0.01)	(0.01)
Non-combat specialty (combat service, service support)					0.02
					(0.01)**
Non-combat specialty who witnessed killed enemy					-0.01
					(0.01)
Non-combat specialty who witnessed killed civilian					0.01
					(0.02)

	Model 1	Model 2	Model 3	Model 4	Model 5
Non-combat specialty who entered or inspected					-0.02
					(0.01)

destroyed military vehicle					
Female who witnessed killed enemy				-0.03	
				(0.02)	
Female who witnessed killed civilian				0.05	
				(0.06)	
Female who entered or inspected destroyed military vehicle				0.01	
				(0.04)	
Observations	15847	15847	15847	15811	15811
Standard errors in parentheses					
† significant at 10%; * significant at 5%; ** significant at 1%					

APPENDIX D. ARMY COMPLETE REGRESSION RESULTS

Table 12. Army Regression Results (Marginal Effects)

	Model 1	Model 2	Model 3	Model 4	Model 5
Casualty Experience	0.01	0.01	0.01		
	(0.003)*	(0.01)	(0.003)**		
Weapon Usage	-0.01	-0.01	-0.01		
	(0.003)**	(0.01)**	(0.003)**		
Female	0.11	0.11	0.11	0.1	0.11
	(0.01)**	(0.01)**	(0.01)**	(0.01)**	(0.01)**
Age (at time of marriage)	-0.003	-0.003	-0.003	-0.003	-0.003
	(0.0004)**	(0.0004)**	(0.0004)**	(0.0004)**	(0.0004)**
Paygrade (at time of marriage)	0.01	0.01	0.01	0.01	0.01
	(0.001)**	(0.001)**	(0.001)**	(0.001)**	(0.001)**
Change in dependent quantity	-0.03	-0.03	-0.03	-0.03	-0.03
	(0.003)**	(0.003)**	(0.003)**	(0.003)**	(0.003)**
Black	0.002	0.002	0.002	0.002	0.004
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Other race	-0.01	-0.01	-0.01	-0.01	-0.01
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Hispanic	-0.003	-0.003	-0.003	-0.004	-0.003
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Unknown race	0.01	0.01	0.01	0.01	0.01
	(0.004)**	(0.004)**	(0.004)**	(0.004)**	(0.004)**
High school graduate or above	0.01	0.01	0.01	0.01	0.01
	(0.004)†	(0.004)†	(0.004)†	(0.004)†	(0.004)†
College Degree	-0.02	-0.02	-0.02	-0.02	-0.02
	(0.01)*	(0.01)*	(0.01)*	(0.01)*	(0.01)*
AFQT	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001
	(0.00007)	(0.00007)	(0.00007)	(0.00007)	(0.00007)
Married in 2001	0.09	0.09	0.09	0.1	0.1
	(0.01)**	(0.01)**	(0.01)**	(0.01)**	(0.01)**
Married in 2002	0.09	0.09	0.09	0.09	0.09
	(0.01)**	(0.01)**	(0.01)**	(0.01)**	(0.01)**
Married in 2003	0.08	0.08	0.08	0.08	0.08
	(0.01)**	(0.01)**	(0.01)**	(0.01)**	(0.01)**

	Model 1	Model 2	Model 3	Model 4	Model 5
Married in 2004	0.04	0.04	0.04	0.04	0.04
	(0.005)**	(0.005)**	(0.005)**	(0.005)**	(0.005)**
Medical Service	0.03	0.03	0.03	0.03	
	(0.01)**	(0.01)*	(0.01)**	(0.01)**	
Combat Service	0.01	0.01	0.01	0.01	
	(0.003)**	(0.01)*	(0.003)**	(0.003)**	
Service Support	0.03	0.02	0.03	0.03	
	(0.003)**	(0.01)**	(0.003)**	(0.003)**	
Member of medical service who witnessed casualty		-0.004			
		(0.01)			
Member of combat service who witnessed casualty		-0.0006			
		(0.01)			
Member of service support who witnessed casualty		0.001			
		(0.01)			
Member of medical service who fired weapon		-0.003			
		(0.01)			
Member of combat service who fired weapon		-0.00003			
		(0.01)			
Member of service support who fired weapon		0.02			
		(0.01)*			
Female who witnessed casualty			-0.01		
			(0.01)		
Female who fired weapon			0.01		
			(0.02)		
Witnessed killed enemy				-0.0002	0.002
				(0.003)	(0.01)
Witnessed killed civilian				0.0004	0.002
				(0.004)	(0.01)
Entered or inspected destroyed military vehicle				-0.004	-0.01
				(0.003)	(0.01)

	Model 1	Model 2	Model 3	Model 4	Model 5
Fired a weapon from sea				0.08	-0.07
				(0.08)	(0.001)
Fired a weapon from air				-0.02	-0.04
				(0.03)	(0.04)
Non-combat specialty (medical, combat service, service support					0.02
					(0.004)**
Non-combat specialty who witnessed killed enemy					-0.003
					(0.01)
Non-combat specialty who witnessed killed civilian					-0.003
					(0.01)
Non-combat specialty who entered or inspected destroyed military vehicle					0.003
					(0.01)
Non-combat specialty who fired weapon from sea					0.93
					(0.001)
Non-combat specialty who fired weapon from air					0.12
					(0.15)
Female who witnessed killed enemy				0.0005	
				(0.01)	
Female who witnessed killed civilian				-0.01	
				(0.01)	
Female who entered or inspected destroyed military vehicle				0.01	
				(0.01)	
Female who fired weapon from air				0.57	
				(0.26)**	
Observations	43939	43939	43939	43939	43939
Standard errors in parentheses					
† significant at 10%; * significant at 5%; ** significant at 1%					

APPENDIX E. AIR FORCE COMPLETE REGRESSION RESULTS

Table 13. Air Force Regression Results (Marginal Effects)

	Model 1	Model 2	Model 3	Model 4	Model 5
Casualty Experience	0.01	0.003	0.01		
	(0.01)	(0.01)	(0.01)		
Weapon Usage	0.01	0.05	0.02		
	(0.03)	(0.04)	(0.03)		
Female	0.12	0.12	0.12	0.12	0.12
	(0.01)**	(0.01)**	(0.01)**	(0.01)**	(0.01)**
Age (at time of marriage)	-0.01	-0.01	-0.01	-0.01	-0.01
	(0.001)**	(0.001)**	(0.001)**	(0.001)**	(0.001)**
Paygrade (at time of marriage)	0.003	0.003	0.003	0.003	0.003
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Change in dependent quantity	-0.1	-0.1	-0.1	-0.1	-0.1
	(0.01)**	(0.01)**	(0.01)**	(0.01)**	(0.01)**
Black	-0.005	-0.005	-0.005	-0.01	-0.004
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Other race	-0.02	-0.02	-0.02	-0.02	-0.02
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Hispanic	-0.02	-0.02	-0.02	-0.02	-0.02
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Unknown race	0.01	0.01	0.01	0.01	0.01
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
High school graduate or above	-0.005	-0.005	-0.005	-0.004	-0.004
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
College Degree	-0.04	-0.04	-0.04	-0.04	-0.04
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
AFQT	0.00003	0.00003	0.00003	0.00003	0.00001
	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)
Married in 2001	0.23	0.23	0.23	0.23	0.23
	(0.02)**	(0.02)**	(0.02)**	(0.02)**	(0.02)**
Married in 2002	0.19	0.19	0.19	0.19	0.19
	(0.02)**	(0.02)**	(0.02)**	(0.02)**	(0.02)**

	Model 1	Model 2	Model 3	Model 4	Model 5
Married in 2003	0.13	0.13	0.13	0.13	0.13
	(0.01)**	(0.01)**	(0.01)**	(0.01)**	(0.01)**
Married in 2004	0.09	0.09	0.09	0.09	0.09
	(0.01)**	(0.01)**	(0.01)**	(0.01)**	(0.01)**
Medical Service	0.02	0.02	0.02	0.02	
	(0.02)	(0.02)	(0.02)	(0.02)	
Combat Service	0.004	0.003	0.003	0.002	
	(0.01)	(0.01)	(0.01)	(0.01)	
Service Support	0.01	0.01	0.01	0.01	
	(0.01)*	(0.01)	(0.01)*	(0.01)	
Member of medical service who witnessed casualty		0.01			
		(0.03)			
Member of combat service who witnessed casualty		0.002			
		(0.02)			
Member of service support who witnessed casualty		0.02			
		(0.02)			
Member of combat service who fired weapon		-0.04			
		(0.05)			
Member of service support who fired weapon		-0.05			
		(0.04)			
Female who witnessed casualty			0.01		
			(0.02)		
Female who fired weapon			-0.05		
			(0.06)		
Witnessed killed enemy				0.04	0.001
				(0.02)	(0.03)
Witnessed killed civilian				-0.01	0.001
				(0.02)	(0.03)
Entered or inspected destroyed military vehicle				-0.02	0.01
				(0.02)	(0.03)
Fired a weapon from air				-0.04	0.25
				(0.08)	(0.35)

	Model 1	Model 2	Model 3	Model 4	Model 5
Non-combat specialty (medical, combat service, service support)					0.01
					(0.01)
Non-combat specialty who witnessed killed enemy					0.01
					(0.03)
Non-combat specialty who witnessed killed civilian					-0.003
					(0.03)
Non-combat specialty who entered or inspected destroyed military vehicle					-0.01
					(0.03)
Non-combat specialty who fired weapon from air					-0.11
					(0.03)
Female who witnessed killed enemy				-0.09	
				(0.02)**	
Female who witnessed killed civilian				0.07	
				(0.05)	
Female who entered or inspected destroyed military vehicle				0.13	
				(0.06)*	
Female who fired weapon from air				0.33	
				(0.42)	
Observations	13602	13600	13602	13597	13597
Standard errors in parentheses					
* significant at 5%; ** significant at 1%					

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